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ABSTRACT

This is the report of a study conducted at Northeast Missouri State College to discover if tutoring and advising can change academically unsuccessful freshmen into more successful students. To this end, a total of 799 students were tutored by competent upper-division students during the 1970-71 academic year in the fields of English, mathematics, social science, and science. Results show that this method is a relatively effective means for raising achievement levels of a substantial number of freshmen and/or sophomores in certain required courses. Students predicted lowest in achievement appeared to profit least from tutoring, or did not take advantage of it. Those predicted in the average range appeared to profit most from tutoring and participated most. The numbers of freshmen placed on probation or suspension during 1970-71 were reduced as compared to the corresponding semesters of 1969-70. Individual attention and relative motivation are suspected to be contributing factors in higher achievement levels. (Author/HS)

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Final Report

Project No. O-F-095,
Grant No. OEG-7-71-0002(509),

Robert M. Wright, Ed.D.,

Director of Counseling and Testing Services
Northeast Missouri State College
Kirksville, Missouri 63501

"The Effects of Organized Tutoring And Advising by Upperclassmen with 'Predicted Unsuccessful' Freshmen."

July, 1971.

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ABSTRACT

Title of Project: "The Effects of Organized Tutoring and Advising by Upperclassmen with 'Predicted Unsuccessful' Freshman."

Principal Investigator: Robert M. Wright, Ed.D., Director of Counseling and Testing Services, Northeast Missouri State College.

Contracting Agency: Northeast Missouri State College, Kirksville, Missouri.

Purposes and Objectives: The principal purpose of the project is implied in the title of the study above. Can tutoring and advising change unsuccessful freshmen into more successful students?

Procedures: Discriminant prediction equations were developed during the summer of 1970, to be used in early identification of freshmen with lower ability in English, Math, Social Science, and Science. Factors used in these equations were the four sub-scores of the ACT tests, units of high school credit in the four areas, average high school grades in the four areas, age upon entrance to college, and college grades earned in the four academic areas. The predictive efficiency of these equations ranged above 0.65 in the higher and lower grading levels at this college. Tutoring was provided during 1970-71, for all predicted or demonstrated lower achieving students in the four academic areas.

Results: A total of 799 students were tutored during the 1970-71 academic year. The need for tutoring was temporary for some and more pronounced for others. The movement of students from lower predicted or demonstrated levels of achievement to higher earned levels appeared to be statistically significant at the 0.01 level or beyond in Math, Social Science, and Science. It was not significant in English, but was in a hoped-for direction.

Conclusions: Tutoring and advising by competent upperclassmen appeared to be a relatively effective means for raising achievement levels of a substantial number of freshmen and/or sophomores in certain required courses at this college. Students predicted lowest in achievement appeared to profit least from tutoring, or did not take advantage of it. Those predicted in the average range appeared to profit most from tutoring and participated most. The numbers of freshmen placed on probation or suspension during 1970-71, were reduced when compared to the corresponding semesters of 1969-70. Individual attention and relative motivation are suspected to be contributing factors in higher achievement levels.

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Upperclassmen with 'Predicted Unsuccessful' Freshman."

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U.S. DEPARTMENT OF
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Office of Education
National Center of Educational Research and Development

PREFACE

Greatful acknowledgment is extended to the following faculty and staff who helped in many capacities with the initiation and completion of this project:

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Dr. Eli F. Mittler, Vice-President for Extra Divisional Affairs, and Coordinator of the Project Group.

Mr. Jerry Gregory, Assistant Director of Freshman Enrollment, who helped contact many freshmen on probation to encourage them to participate in tutoring services.

Dr. Earl Ludlow, Professor of Education, and statistical consultant.

Mrs. Mary Sue Beersman, Assistant Professor of Mathematics, and statistical consultant.

Dr. Loren Grissom, Professor of English Education, and Director of Student Teaching, tutorial consultant.

Dr. Gilbert C. Kohlenberg, Head, Division of Social Science, and Coordinator of Social Science tutors.

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Dr. Allen P. Whitmore, Head, Division of Language and Literature, Coordinator of English tutors.

Dr. Dale Woods, Head, Division of Mathematics, who was the initiator of the project, and who was the Consultant for Mathematics tutors. The greatest number of students were tutored in Mathematics and the greatest gains from tutoring appeared in this academic area.

Dr. Robert Bradley, Director of the Data Processing Center, and several programmers in the center, helped in deriving the prediction equations for freshmen.

Miss Vicki Paustian and Mrs. Shirley Mayfield, graduate assistants in Counseling and Guidance, who tabulated much of the raw data into meaningful form.

To all of the upperclass tutors who served so well in this project. It is hoped that they gained as much from the experience as they gave to the project.

Finally, to the few "cited" references in the Introduction, and to many others who have explored aspects of this problem, our thanks for the inferences derived from published professional literature. See the selected references in the bibliography.

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Chapter 1. Introduction

Statement of Problem.

A problem common to many colleges, particularly of average-sized-publicly-supported state colleges, is how best to cope with the appreciable number of admissible freshmen who fail to obtain a satisfactory grade-point-average (GPA) in one or more subject-matter areas.

As an example of the magnitude of this problem at the Northeast Missouri State College (Kirksville, Missouri), the following observation was made at mid-semester in the fall of 1969. Of the 1,346 new freshmen who entered this college in the fall of 1969, it was found that about 50 percent of them were rated by the faculty as having less than a C grade in one or more courses at mid-semester. At the end of the fall semester of 1969, it was found that some of these deficient freshmen had brought their grades up, but approximately one-fourth of them were placed on scholastic probation, with less than a 1.50 cumulative GPA, (based upon a 4.0 system).

Increasing administrative and faculty concern about this problem led to a consideration of using academically successful upperclassmen to tutor deficient freshmen during the spring semester of 1970. Although tutoring was offered in the spring of 1970, the lack of reliable prediction equations for estimating the potential of each freshman (in specific subject matter areas) made it next to impossible to statistically evaluate the results of this tutoring. In addition, the tutors were not trained particularly to perform their tasks.

Related Studies.

The studies of Anderson, Weaver, and Wolf (1), in 1965, Brown (2), in 1965, and of Morgan (4), in 1970, had stimulated certain mathematics faculty and other college personnel to propose a research project to the U.S. Office of Education. Although two of the above studies dealt primarily with academically deficient students in the area of college mathematics, they did form some degree of direction for a study at this college in the four areas of English, Mathematics, Social Science, and Natural Science.

Objectives.

The objectives of this investigation were to be completed as follows: (1) To perform a discriminant function analysis in order to yield discriminate equations for the prediction of success in certain required freshman classes. This analysis was programmed for the college computer during the summer of 1970. (2) To investigate the results of the use of qualified upperclassmen as tutors and advisors in basic freshman classes during 1970-71. (3) As a by-product of this study, to provide pre-professional experiences for upperclassman tutors who were or who would be aspiring to the teaching profession. These upperclassmen would receive in-service training and supervision as tutors and advisors for freshmen under the Director of Student Teaching and the Director of Counseling and Testing.

The classes in which tutoring services were to be provided were in four major academic areas of English, Mathematics, Social Science, and Natural Science. All freshmen would have at least one course required in each of these four areas. More specifically, the courses were as follows: LL 100 and 101 Fundamentals of English; MT 164 Contemporary Mathematics I, or MT 172 Number Systems I, or MT 176 Mathematical Analysis, or MT 186 Elementary Functions, or MT 196 Analytic Geometry; SS 120 World Civilization, or SS 223 U.S. History Survey I, or SS 275 Religion and Human Culture I; SC 100 Biological Inquiry I, or SC 120 General Chemistry, or SC 185 College Physics.

Description of Activities (Procedures).

Information was available on the grades earned by 950 ACT tested freshmen who were enrolled in the above mentioned classes during the first or second semesters of the 1969-70 academic year. Freshman students who received grades of A, B, or C in the above mentioned classes were assigned as the "Successful Group" for the purposes of this analysis. Those students who received grades of D, F, WF, or Inc., were denoted as the "Unsuccessful Group" for purposes of this analysis.

For this investigation, discriminant equations of the form:

$$\text{Final Grade} = C_0 + \sum_{i=1}^4 C_i X_i \text{ for the prediction of success}$$

in each 1969-70 freshman basic course were derived. The derivation of the equation followed closely the method used by

Morgan (4), and the following information was used to derive each equation:

- (1) ACT Standard Scores in each specific subject matter area of English, Math, Social Science, and Natural Science.
- (2) The number of units of academic high school courses earned by each student in each of the above four academic areas.
- (3) The mean high school grade earned by each student in each of the specific academic areas above, based upon a 4.0 maximum scale.
- (4) The student's age in months beyond the 17th birthday, upon admission to this college.
- (5) College grades earned by each student in each of the above four areas.

As in the procedure used by Morgan (4), the predicted grades of the students employed in the study were calculated. Then each student's predicted performance, if not satisfactory (less than a C average), was compared with his actual performance in basic college courses. This gave the per cent of cases for which the prediction was accurate.

Following the derivation of the prediction equations a test was made of an experimental hypothesis during 1970-71. For purposes of statistical analysis, the hypothesis was stated in null hypothesis form and tested the null hypothesis against an alternate hypothesis. Consequently, the hypothesis was stated in null hypothesis form as: "The predicted or demonstrated semester success of college freshmen in required basic courses cannot be changed by use of upperclassmen as tutors and advisors during the entire first or second semester".

To evaluate the hypothesis it was decided to use each student's predicted performance in each required freshman course, as compared with his actual performance at the end of each semester in 1970-71. Beginning on September 28, 1970 and ending on May 20, 1971, competent upperclassmen (as selected by the respective Heads of Instructional Divisions concerned) conducted individual or group tutorial and advising sessions in basic freshman classes. Faculty members teaching these classes strongly encouraged predicted or demonstrated unsuccessful freshmen to attend these sessions. In some instances a special tutor was

provided for a student who was having difficulty in becoming a member of the more academically successful group. Essentially, the objective was to try to contradict our predictions for unsuccessful freshmen (based upon the performance of unsuccessful freshmen in 1969-70) by introducing organized tutoring and advising services for predicted or demonstrated unsuccessful freshmen during 1970-71.

The Freshman Enrollment Office at this college assigns approximately one-half of entering freshmen to required courses in Language and Literature, Mathematics, Social Science, and Natural Science during the first semester and the remainder of the freshmen to these courses during the second semester. The stated experimental hypothesis was therefore to be tested for the freshmen who enrolled in these courses during both the first and second semesters of 1970-71. Data was to be analyzed and an evaluation was to be made of the results at the end of each semester of 1970-71.

The analysis would follow the procedure used by Wert, Neidt, and Ahmann's (5) Statistical Methods in Educational and Psychological Research. New York: Appleton-Century-Crofts, 1954. The data would be analyzed by means of the 1401 IBM computer on campus, as well as using office calculators. The Discriminant Function Analysis (stepwise) program written by Hurst and Wiser (3), Discriminant Function Analysis (stepwise) and the 1620 General Program Library, 1962, was adopted.

Summary.

(1) There was a recognized need to develop more discriminant prediction equations which would better identify "unsuccessful freshmen" in major required courses at this college. This identification would be made prior to actual enrollment and to be (hopefully) accurate in 60 to 90 per cent of the cases, as was found in the Morgan (4) study referred to herein.

(2) There was a recognized need to intervene in the cases of predicted unsuccessful freshmen by introducing factors or events which would make them more likely to succeed in required courses. In this particular study the factors of tutoring and advising by qualified upperclassmen were introduced. Hopefully, the lessons learned here can serve as departure points for other colleges who have similar problems with their freshmen.

(3) As a by-product of this investigation, it was hoped that the experiences gained by the upperclassmen in tutoring

(under supervision) would apply to their greater competency as teachers-in-training and ultimately as teachers in public or private schools.

(4) The majority of project funds was to be used for tutoring fees, office and clerical help, necessary supplies, etc. Faculty and staff time was to be furnished by the college, along with the necessary facilities and equipment.

Chapter 2. Methods or Procedures

Preliminary Activities.

During the spring semester of 1970, the Counseling and Testing Staff of Northeast Missouri State College helped to develop (discriminant) multiple regression equations to be used for the prediction of grades most likely to be earned by college freshmen in four required academic areas. Assisting in this endeavor were members of the Division of Mathematics faculty, certain Data Processing Center personnel, and other faculty and staff.

The four required academic areas were centered primarily in the academic divisions of Language and Literature (English), Mathematics, Social Science, and Science. A primary purpose for developing these prediction equations was a need to foster an early identification of new freshmen who might profit from better placement, tutoring, or other assistance in certain required courses. The planned tutoring program for freshmen was to be staffed by upperclass students who were judged competent to provide this service by the respective Division Heads of the academic divisions referred to above. The tutoring fees for these upperclass tutors, plus other necessary expenses were to be paid from a Research Grant from the U.S. Office of Education. The time given by the professional staff at the college was to be covered from college funds.

The before-mentioned "prediction equations" were weighted with the following factors: (1) Specific ACT test scores earned by students in English, Mathematics, Social Studies, and Natural Sciences; (2) the number of units of high school credit earned by each freshman in each of the four academic areas; (3) the average high school grades earned by each freshman in the four areas, and (4) the age in months above 17 years upon admission to this college. Parenthetically, it should be mentioned that the age factor was found to have little weight, except in predicting Math grades at this college.

The Beta weights of each of the above factors were determined by their relative relationship to individual grades earned by the freshmen during the 1969-70 academic year in the four academic areas. The multiple correlation coefficients for each of the four equations were decidedly positive and high enough to indicate a predictive efficiency of 65 per cent as a minimum and ranging higher at the upper and lower grading levels.

The computer programs developed for the 1969-70 prediction equations were retained in the Data Processing Center and the same kinds of basic data were introduced into the computer for individual 1970-71 freshmen early in the fall semester of 1970. Because of some missing ACT test scores, or incomplete high school transcripts for some freshmen, it was not possible at that time to predict grades in all four academic areas for all of the freshmen. However, the computer center did furnish an early list of predicted grades in all four academic areas for 973 of the 1,300 plus 1970-71 freshmen. This represented about 75 per cent of the freshman class who had equation predictions available.

Collection of Data at the End of the Fall of 1970.

Upperclass tutors were required to submit monthly reports on each student tutored in a specific academic area. This report gave the name and Social Security number of each student, the name of the course for which tutoring was provided, the number of hours of tutoring provided, areas of deficiency observed, activities engaged in, etc. When possible, the tutor was to find out the grade rating of the student in the particular class from the instructor. Tutoring was provided for individuals, for groups of two or three students, or up to 30 students in a group. The Division of Language and Literature (English), in particular, seemed to favor tutoring (or re-teaching) in larger groups. This presented a problem for the tutors in terms of record keeping on individual students. It is certain that many students received tutoring in this area for whom there were no records or who had incomplete records. This will be noted in the relatively fewer students appearing in the data for English tutoring.

At the end of the fall semester of 1970, there had been received the names and other data on 465 freshmen and some sophomores who had complete records of being tutored during the fall. These names were compared with the 973 freshman names on the grade prediction list. It was found that 129 of the tutored students had full predictions in all four of the academic areas. It was also found that only 12 of the 129 tutored students were on the scholastic probation list at the end of the fall semester. This was less than half of what would have been anticipated under non-tutoring conditions.

According to the tutors' individual reports, these 129 students had voluntarily sought tutoring because of a felt deficiency in a particular course or courses, or because of strong recommendations from faculty members. In certain instances, the tutors had the impression that some students had at least average ability in

the subject matter, but they were trying to stay average or raise themselves up to a B or A grade in the course. Whatever their reasons for being tutored, the predicted grades, being somewhat new and untried, were not used to influence freshmen to seek tutoring during the fall semester of 1970.

The Selection of Two Non-tutored Freshman Groups to Compare With the Tutored Freshmen.

Comparison Group I was selected from the freshmen who were on scholastic probation at the end of the fall semester of 1970. All freshmen on probation at that time were checked against the grade prediction list of 973 freshmen. It was found that 119 of the probation freshmen had full predictions in the four academic areas. Only 12 of these predicted-probation freshmen had taken advantage of tutoring during the fall semester. These were the same 12 tutored-probation freshmen referred to in the previous paragraph and they overlapped between the tutored freshmen and Comparison Group I. Because of this overlap, these 12 students were deleted from both groups for the purpose of this study.

The names for Comparison Group II were then selected. These freshmen were matched (on a one-to-one basis from the grade prediction list) with the 117 tutored freshmen who were not on probation and who had essentially the same configuration of predicted grades in the four academic areas. Where possible, matching on the basis of sex was a criterion for selection. The third criterion for selection to Comparison Group II was that these freshmen were not on probation and had not participated in tutoring.

Once the names of the tutored-non-probation freshmen and the names of freshmen in the two comparison groups were available, a reference was made to the fall semester printout of grades earned by freshmen in the four academic areas. These grades were recorded for the proper academic areas opposite the name of each freshman in the three groups. A discussion of the characteristics of Comparison Groups I and II will be reserved for a later part of the Chapter.

It was found that over 90 per cent of the freshmen in the three groups had enrolled in English courses during the fall, but only about 70 per cent had enrolled in Social Science courses, and less than half had enrolled in Math and Science courses. It was assumed that freshmen who did not enroll in these courses during the fall would, for the most part, enroll in these courses during the spring semester. It was decided not to draw other than preliminary inferences about these groups until more grades could be collected after the spring semester.

Assessment of Data at the End of the Spring of 1971.

As mentioned previously, it was not considered that there was sufficient data on students tutored in Math, Social Science, and Science, to draw many inferences for the fall semester. In addition, it was found that there was a rather large group of tutored students on whom no "equation" predictions were available. It was decided that the staff would categorize or predict achievement potentials of these students in a general way, based upon the cumulative GPA each student earned for the fall semester. In other words, those students whose semester GPA was below a 2.0, would be considered below average in ability in most of the academic areas. Those whose semester GPA was in the average range would be considered average in ability in most areas, and those in the 3.0 range would be considered above average in most areas. It was realized, of course, that these general predictions were probably less valid than specific predictions in specific academic areas, but it was the best predictor available and it was desirable to include all tutored students in the study. Allowance was made for a five per cent margin of error in each predicted level of achievement in the statistical calculations.

As data continued to come in during the spring semester, and tabulations were updated, it became obvious that there were differences in configurations of predicted levels of achievement in the specific academic areas. This applied to both those students who were predicted by the equations and those predicted by semester GPA levels. The broad reference points for these observations were the expected grading patterns established by the faculty in each academic area in freshman and sophomore level courses. That is to say, the faculty in Mathematics, for example, tended to assign an expected percentage of A and B grades, a certain percentage of C grades, and a certain percentage of D and F grades rather consistently from year to year. The overall achievement potential of freshmen also remained remarkably consistent from year to year. When these expected patterns of grading (associated with the ability levels of freshmen and sophomores in general), were compared with the predicted levels of achievement of students who were being tutored, it was obvious that tutored students were unlike freshmen and sophomores in general. The differences between predicted patterns of achievement and the expected patterns of grading were found to be statistically significant at the 0.01 level of confidence in all four academic areas. This was true for either type of predictors.

In the first three tables to follow, the frequency expected (fe) for various grading levels of the faculty in the four academic areas are compared with the frequency predicted (fp) for grade levels among tutored students in the four academic areas.

It would probably be well to look specifically at the data in Table 1 and to explain what the reader will see in this data. First, the data in this table deals with predicted achievement levels of all freshmen who were tutored in the respective academic areas for both the fall and spring semesters of 1971. These achievement levels are predicted from the prediction equations established for 1970-71 freshmen. None of the tutored freshmen in this table are on probation for either the fall or spring semesters.

Looking at the upper left-hand part of the table, one will note that for those freshmen who were tutored in English during 1970-71, eight (8) per cent had been predicted to make A or B grades in English by the prediction equations, 84 per cent had been predicted to make C grades and 8 per cent had been predicted to make D and F grades in English. One then notes the expected grading pattern for the faculty in English who teach freshman and sophomore level courses. Rather consistently these faculty members will assign 32 per cent of their grades in the A and B level, 41 per cent of their grades in the C level, and 27 per cent of their grades in the D and F level. These grading patterns are based, of course, upon the entire range of achievement potential for freshmen in general or sophomores in general. When one then subtracts the expected frequency of grading (f_e) from the predicted frequency of grades for the tutored students (f_p), the differences observed are then submitted to the Chi-Square technique to determine the significance of differences between the expected and the predicted patterns of achievement and grades earned. The observed differences ($f_p - f_e$) are 24%, 42%, and 19%, respectively for English achievement levels. A standard 5 per cent correction factor was introduced by subtracting 5 per cent from each observed difference in achievement levels. In addition, a small-sample correction factor was introduced in the Chi-Square technique. Computing Chi-Square out and allowing for 2 degrees of freedom in the Chi-Square table, it would appear that the difference between f_p and f_e are statistically significant beyond the 0.01 level of confidence. The same procedures and conclusions are noted for the Chi-Square tables in Mathematics, Social Science, and Science in Table 1.

Tables 2, 3, and 4, to follow, are similar in structure and in procedures for testing the significance of differences of achievement patterns and expected or observed grading patterns.

In Table 4 one will note that the predicted frequency of grades for all 799 tutored students in the four academic areas are compared with the frequency of grades they actually earned in these areas during 1970-71. The differences between predicted grade levels and earned grade levels of these tutored students will reveal whether significant gains are attributed to tutoring services in four areas.

Table 1.

A comparison of the expected grading patterns (fe) of faculty in four academic areas with the predicted achievement patterns (fp) of tutored students in each area. Predicted grades are based upon the derived prediction equations.

ENGLISH ACHIEVEMENT (Letter Grades)				SOCIAL SCIENCE ACHIEVE. (Letter Grades)			
	A & B	C	D & F		A & B	C	D & F
fp	8%	84%	8%	fp	2%	55%	43%
fe	32%	41%	27%	fe	28%	45%	27%
fp-fe	24%	42%	19%	fp-fe	25%	10%	16%
Chi-Square = 19.43 df = 2 P = 0.01 and beyond. (sig.) N = 26 tutored students.				Chi-Square = 13.51 df = 2 P = 0.01 and beyond. (sig.) N = 65 tutored students.			
MATHEMATICS ACHIEVEMENT (Letter Grades)				SCIENCE ACHIEVEMENT (Letter Grades)			
	A & B	C	D & F		A & B	C	D & F
fp	3%	59%	37%	fp	3%	89%	8%
fe	37%	32%	31%	fe	31%	51%	18%
fp-fe	34%	27%	6%	fp-fe	28%	38%	10%
Chi-Square = 44.71 df = 2 P = 0.01 and beyond. (sig.) N = 118 tutored students.				Chi-Square = 24.28 df = 2 P = 0.01 and beyond. (sig.) N = 61 tutored students.			

Corrections for small samples and a 5 per cent correction for each grade cell above are included in the Chi-Square calculations.

Table 2.

A comparison of the expected grading patterns (fe) of faculty in four academic areas with the predicted achievement patterns (fp) of tutored students in each area. Predicted grades are based upon end-of-semester GPAs.

ENGLISH ACHIEVEMENT (Letter Grades)				SOCIAL SCIENCE ACHIEVE. (Letter Grades)			
	A & B	C	D & F		A & B	C	D & F
fp	11%	42%	47%	fp	10%	51%	39%
fe	32%	41%	27%	fe	28%	45%	27%
fp-fe	21%	1%	20%	fp-fe	18%	6%	12%
Chi-Square = 9.53 df = 2 P = 0.01 (significant) N = 57 tutored students.				Chi-Square = 10.07 df = 2 P = 0.01 and beyond. (sig.) N = 128 tutored students.			
MATHEMATICS ACHIEVEMENT (Letter Grades)				SCIENCE ACHIEVEMENT (Letter Grades)			
	A & B	C	D & F		A & B	C	D & F
fp	27%	58%	16%	fp	13%	59%	29%
fe	37%	32%	31%	fe	31%	51%	18%
fp-fe	10%	26%	15%	fp-fe	18%	8%	11%
Chi-Square = 41.04 df = 2 P = 0.01 and beyond. (sig.) N = 232 tutored students.				Chi-Square = 8.53 df = 2 P = between 0.01 and 0.02. N = 112 tutored students.			

Corrections for small samples and a 5 per cent correction for each grade cell above are included in the Chi-Square calculations.

A comparison of the data in Tables 1 and 2 on the previous two pages would indicate that:

1. There were about twice as many tutored students whose grades were predicted by cumulative semester GPAs than there were tutored students predicted by the "equations" in each area.
2. The semester GPA predictor tends to place a greater percentage of tutored students in the A and B range of potential in each academic area, than are placed by the equations.
3. All tutored students tended to peak in the C range of predicted grades, when compared to the expected percentage of grades assigned by faculty in each academic area. This is true for both sets of predictors.
4. Semester GPA predictions tended to place many more tutored students in the D and F range of predicted grades in English and Science, whereas the equation predictions placed more tutored students in the D and F range in Math and approximately the same amount in Social Science.
5. It seemed possible that an averaging process between specific equation predictions and general semester GPA predictions would be closer to expectations in the final analysis.

In Table 3, on the following page, the reader will note the results of adding together the number of students predicted in each grade level category, using both prediction factors. It should be kept in mind that semester GPA predictions outnumber the equation predicted students by about two-to-one in each academic area. This could lead to a certain degree of error in predictive efficiency, due to the unequal number of students in the two predicted groups.

There is, however, one thing in common for all tutored students. They actively sought tutoring to improve themselves, or they more-or-less willingly accepted recommendations for tutoring. Whatever the predicted levels of achievement for these students, it could be assumed that there was a felt need or an accepted need to use tutoring services. This might have been only of temporary nature for many students who had failed to grasp a principle or a process in regular class meetings. For others it might have represented a lack of background for the subject matter area and would have demanded extensive tutoring in order to catch up with the rest of the class. For still others it might have represented a general lack of academic ability and no amount of tutoring would have been very effective.

Table 3.

A comparison of expected grading patterns (fe) of faculty in the four academic areas with the predicted achievement levels (fp) of tutored students in each area. Predicted grades are based upon both the equations and the end-of-semester GPAs.

ENGLISH ACHIEVEMENT (Letter Grades)				SOCIAL SCIENCE ACHIEVE. (Letter Grades)			
	A & B	C	D & F		A & B	C	D & F
fp	10%	55%	35%	fp	7%	52%	41%
fe	32%	41%	27%	fe	28%	45%	27%
fp-fe	22%	14%	8%	fp-fe	21%	7%	14%
Chi-Square = 9.21 df = 2 P = 0.01 (significant) N = 83 tutored students.				Chi-Square = 22.39 df = 2 P = 0.01 (significant) N = 193 tutored students.			
MATHEMATICS ACHIEVEMENT (Letter Grades)				SCIENCE ACHIEVEMENT (Letter Grades)			
	A & B	C	D & F		A & B	C	D & F
fp	19%	58%	23%	fp	9%	69%	22%
fe	37%	32%	31%	fe	31%	51%	18%
fp-fe	18%	26%	8%	fp-fe	22%	18%	4%
Chi-Square = 65.87 df = 2 P = 0.01 (significant) N = 350 tutored students.				Chi-Square = 22.23 df = 2 P = 0.01 (significant) N = 173 tutored students.			

Corrections for small samples and a 5 per cent correction for each grade cell above are included in the Chi-Square calculations.

It will be noted in Table 3 on the previous page that there are still statistically significant differences between predicted and expected grade distributions for the total number of tutored students during 1970-71. This difference is observed in all four academic areas, as was noted in Table 1 and Table 2, where the two different types of predictors are used. This tends to support the conclusion that the majority of tutored students had different achievement potentials or different degrees of potential than did the freshmen or sophomores in general. Otherwise, why did they utilize tutoring services when a large percentage of freshmen did not?

There is still noted the decided "peaking" effect in the C range of predicted achievement, although it varies from one academic area to another. Another peaking effect is noted in the D and F range of predicted achievement in English, Social Science, and Science, with this effect being reversed in Mathematics. It is, however, in the A and B range of predicted achievement that one notices the greatest and most consistent divergence from the expected grading patterns of the faculty in the four academic areas. One wonders why any of these predicted "superior" students felt it was necessary to participate in tutoring? Some undoubtedly were motivated to remain in this range or to regain this range due to temporary setbacks. The extent to which these predicted A and B students maintained their position, and a significant percentage of C students moved into the A and B range, presumably due to tutoring, is revealed in Table 4 to follow.

One will note immediately in Table 4 that there were appreciable gains in grade level for students predicted in the C range of potential achievement. It is presumed that tutoring and/or higher motivational levels contributed to this gain. Gains appear to be much smaller for students predicted in the D and F range of achievement potential. In Science there seems to be a regression effect; that is to say, more students earned D and F grades in this area than had been predicted.

One will also note that the differences in distributions of earned grades compared to predicted grades for tutored students were statistically significant, except in English and even here the apparent gains from tutoring were in the hoped-for direction.

Although the gains attributed to tutoring in the D and F range seemed disappointingly small, it was found upon closer examination that there were significant movements of students within this category. It was found that tutored students earned more D grades and fewer F grades than would have been predicted. This was statistically significant in Mathematics and Social Science and in a hoped-for direction in Science. More F grades were made in English.

Table 4.

The distributions of grades earned (fe) by 799 tutored students during the fall and spring of 1970-71, compared with their "predicted" grade distributions (fp) in four academic areas.

ENGLISH ACHIEVEMENT (Letter Grades)				SOCIAL SCIENCE ACHIEVE. (Letter Grades)			
	A & B	C	D & F		A & B	C	D & F
fe	20%	46%	34%	fe	17%	47%	36%
fp	10%	55%	35%	fp	7%	52%	41%
fe-fp	10%	9%	1%	fe-fp	10%	5%	5%
Chi-Square = 2.72 df = 2 P = 0.28 (not significant) N = 83 tutored students.				Chi-Square = 6.95 df = 2 P = 0.03 (significant) N = 193 tutored students.			
MATHEMATICS ACHIEVEMENT (Letter Grades)				SCIENCE ACHIEVEMENT (Letter Grades)			
	A & B	C	D & F		A & B	C	D & F
fe	38%	40%	22%	fe	20%	51%	29%
fp	19%	58%	23%	fp	9%	69%	22%
fe-fp	19%	18%	1%	fe-fp	11%	18%	7%
Chi-Square = 48.65 df = 2 P = 0.01 (significant) N = 350 tutored students.				Chi-Square = 10.85 df = 2 P = 0.01 (significant) N = 173 tutored students.			

Corrections for small samples and a 5 per cent correction for each grade cell above are included in the Chi-Square calculations.

A Comparison Group of Non-tutored Freshmen on Academic Probation.

Reference has been made previously to a Comparison Group I of freshmen who had "equation" predictions in all four academic areas and who were found to be on probation at the end of the fall semester. It was also noted that none of the freshmen in this group had taken advantage of tutoring services. When this probation-non-tutored group's configuration of predicted achievement was compared with the configuration for non-probation-tutored freshmen for the fall semester, it was found that the probation freshmen had a much larger percentage of grades predicted and earned below 2.0 than did the non-probation freshmen. However, the probation-non-tutored freshmen still had a majority of their members predicted in the average range of achievement.

In the upper part of Table 5 on the next page, one will note the predicted grade levels and the earned grade levels for the fall semester probation-non-tutored freshmen. Although many of these freshmen were predicted in the 2.0 to 3.0 range of achievement, it is noted that 59 per cent of the grades earned by these "average" students among the four academic areas were below a 2.0 GPA. Looking then at the probation freshmen who were predicted below a 2.0 in the four academic areas, one will note that 77 per cent of the grades they earned among the four areas were below a 2.0 GPA.

Now examining the lower part of Table 5, it will be noted that those equation predicted freshmen who remained on probation at the end of the spring semester of 1971, were all predicted below a 2.0 among the four academic areas. Those probation freshmen who had been predicted in the average range for the fall semester have disappeared from the data in the spring semester. One must assume that these particular freshmen took their formal notice of probation status rather seriously. Some, of course, withdrew from college in a state of discouragement, but the majority recovered from their academic slump without the benefit of tutoring services. This leads one to the conclusion that some students with average or above average potential will stir themselves academically when faced with imminent suspension for academic reasons.

The efficiency of the freshman prediction equations becomes more apparent when examining the probation-prone freshmen in the lower part of Table 5. It will be noted that 80 per cent of the grades earned by this below-average group of freshmen were below a 2.0 GPA, as had been predicted for them. One wonders whether tutoring would have been a solution for these students, even if it had been forced upon them? A singular lack of utilization of tutoring services by lower ability and probable-probation students has been noted throughout this study.

Table 5.

A comparison of the predicted grade levels (PGL) and the earned grade levels (EGL) of freshmen placed on academic probation after the fall and spring semesters of 1970-71. All freshmen were predicted by the prediction equations. None received tutoring in any of the four academic areas.

FALL SEMESTER, 1970

(PGL) Predicted below 2.0								(PGL) Predicted from 2.0-3.0						
<u>EGL</u>	(En)	(Ma)	(SS)	(NS)	(T)	(%)	<u>EGL</u>	(En)	(Ma)	(SS)	(NS)	(T)	(%)	
4.0	0	0	0	0	0	0	4.0	0	0	0	0	0	0	
3.0	1	0	0	0	1	1	3.0	4	0	0	0	4	3	
2.0	12	3	4	1	20	22	2.0	35	5	8	7	55	38	
1.0	12	3	25	1	41	45	1.0	18	6	16	14	54	37	
0.0	8	3	19	0	30	32	0.0	13	1	6	13	33	22	
Total 33 9 48 2 92 100%							Tot.	70	12	30	34	146	100%	

SPRING SEMESTER, 1971

(PGL) Predicted below 2.0								(PGL) Predicted from 2.0-3.0						
<u>EGL</u>	(En)	(Ma)	(SS)	(NS)	(T)	(%)	<u>EGL</u>	(En)	(Ma)	(SS)	(NS)	(T)	(%)	
4.0	0	0	0	0	0	0	4.0	0	0	0	0	0	0	
3.0	2	0	0	0	2	2	3.0	0	0	0	0	0	0	
2.0	6	3	7	2	18	18	2.0	0	0	0	0	0	0	
1.0	7	9	15	1	32	32	1.0	0	0	0	0	0	0	
0.0	18	6	24	0	48	48	0.0	0	0	0	0	0	0	
Total 33	18	46	3	100	100%		Tot.	0	0	0	0	0	0%	

A Comparison Group of Non-tutored Freshmen Matched to Tutored Freshmen by Means of the Prediction Equations. (Comparison Group II).

The matching process used herein, and described previously in this chapter, made the non-tutored freshmen in Group II practically identical to the tutored freshmen in this study. That is, in so far as the prediction equations are accurate in estimating achievement potentials for individual students in the four academic areas.

However, in the final analysis of data at the end of the spring of 1971, it was found that comparison of the two groups in English achievement would be questionable. This was due to the rather small number of tutored students reported by English tutors. In Mathematics it was found that there was no significant difference between the two groups in terms of grades predicted and earned in the below 2.0 range of achievement. However, there was a significant difference between the tutored and un-tutored students in the average and above average predicted ranges of achievement. Tutoring appeared to make a real difference for the tutored over the non-tutored freshmen in Mathematics.

In Social Science it was noted that there were no significant differences between the predicted and earned grades for the tutored and non-tutored groups. In Science the un-tutored group earned an insignificant number of grades below a 2.0 GPA at all predicted levels.

It would probably be best to make no assumptions concerning the tutored and non-tutored groups who were matched by freshman prediction equations. Additional analysis of these two groups will be made after this study is published.

Chapter 3. Results

There were three major objectives for this study, as stated in the initial proposal:

1. To develop more discriminating prediction equations; using ACT test results, high school transcript data, and other data, to be used in better identifying various levels of achievement potential of new college freshmen in four required academic areas of English, Mathematics, Social Science, and Science.
2. To determine whether and to what extent academically successful upperclassmen could change the predicted achievement levels of freshmen in a positive direction through tutoring and advising in the four required academic areas.
3. As a by-product of this study, to utilize an in-service training program for upperclass tutors as a means of expanding their experience level with higher academic risk students. It was hoped that this tutoring experience would be helpful as pre-student teaching experiences.

Objective Number 1 above was met with generally satisfactory results. Prediction equations were developed based upon data available on freshman students enrolled during 1969-70. The computer programs established for this purpose were retained and the same kinds of freshman data were introduced into the computer for 1970-71 freshmen. Seventy-five per cent of the new 1970-71 freshmen were found to have specific grade predictions available on them in the four required academic areas early in the fall of 1970. The multiple correlation coefficients for the equations were 0.65 as a minimum and higher at the upper and lower predicted achievement levels.

Objective Number 2 above was well met in that a little over 800 students availed themselves of tutoring services during the fall and spring semesters of 1970-71. The majority of these tutored students were freshmen enrolled in required courses in the four major academic areas. However, some were sophomores who were enrolled in required freshman courses or in required sophomore courses in the same academic areas. Some students are duplicated in the data, if they were tutored in two or more areas during a semester, or if they were tutored in more than one area over the two semesters. Less than four per cent of the tutored students were placed on academic probation during the two semesters. These few probation students were deleted from the data in the study. The total students who were tutored and who were not on probation comes to 799 students during the two semesters. These make up the subjects studied in the project.

(a) It was found that the predicted achievement levels of students who utilized tutoring services were significantly different (in a statistical sense) from the expected grading patterns established by the faculty who taught the required courses in the four academic areas. That is, fewer tutored students were predicted in the superior range of achievement and more were predicted in the average and below-average range than would be expected for freshmen in general or sophomores in general.

(b) It was found that the differences between the predicted achievement levels for tutored students and their earned achievement levels after tutoring were statistically significant (in a positive direction) in Mathematics, Social Science, and Science. They were not significant in English, but were in a hoped-for direction. The lesser number of tutored students in English might have influenced the lesser significance of tutoring results.

(c) The principal achievement gains of tutored students were in their movements from predicted-average achievement levels into above-average-earned achievement levels.

(d) Minor gains from below-average predicted achievement levels into average and above-average earned achievements were noted for tutored students in Mathematics, Social Science, and Science. Gains in English achievement at the below-average level were not conclusive.

(e) Non-tutored students who were placed on academic probation after the fall semester tended to have more students predicted in the average range of anticipated achievement than in the below-average range. Those predicted in the average range, however, tended not to live up to their predictions in terms of earned grades. However, non-tutored students who were on probation at the end of the spring semester were all predicted below-average in potential and 80 per cent of them earned below-average grades in the four academic areas. A combination of predicted average and below-average potential, plus lower motivational levels appeared to be operating among probation-prone freshmen.

It is felt that Objective Number 3 met with considerable success, but it is more difficult to assess than the other two objectives. In-service trained upperclass tutors in the four academic areas indicated that considerable personal satisfaction was gained from their close contacts with tutored students. Some indicated that they learned more about their subject matter specialty than they had learned in the classroom when they were taking these same classes. Much can still be done to make in-service training for tutors more effective.

Chapter 4. Conclusions

1. Tutoring services provided by in-service trained upperclassmen appears to be a relatively effective means for raising achievement levels of freshmen and sophomores in certain required academic areas at this college. Statistically significant gains in achievement levels for tutored students in Mathematics, Social Science, and Science are noted in this study. The most significant gains in achievement were noted among the tutored students in Mathematics. This was particularly true for those students predicted below-average in Mathematics, but who achieved into the C range of grades in significant numbers. Gains were also noted in the below-average predicted level for tutored students in Social Science and Science, but not in such significant numbers. The gains in achievement for students tutored in English were not conclusive, but were in the hoped-for direction.
2. There appears to be a type of "probation-prone" student at this college who is characterized by average to below-average predictions for success in required college courses. It is inferred that the motivational level, or the academic attitudes, of this type of student are different than the motivational levels or attitudes of other students who took advantage of tutoring services. Very few of a substantial number of freshmen who were placed on academic probation at the end of the fall semester of 1970, had utilized tutoring services in any of the required academic areas.

A major conclusion reached concerning these probation-prone students is that providing tutoring services for them is not the most effective means of reducing their possible probation rate or ultimate suspension from this college. It is possible that other means should be provided for these students, or they need to be better screened before admission to this college.

A rather interesting telephone survey of a random sample of probation freshmen was made by the Assistant Director of Freshman Enrollment and some of his counselors after the fall semester of 1970. The telephone interview was semi-structured and was strictly adhered to in each interview. One question asked in the interview was whether they were aware of the tutoring services and if so how did they feel about taking advantage of these services during the spring semester of 1971? All were urged to take advantage of these services.

Thirty-nine (39) per cent of the interviewed freshmen said that they were not aware of tutoring services, although announcements had been made on several occasions in the college newspaper and

announcements were supposed to have been made in every required freshman class. Nine (9) per cent of the interviewed probation freshmen were somewhat neutral toward availing themselves of tutoring services during the spring semester and 17 per cent of them actively rejected the utilization of tutoring services, indicating that they did not feel that they needed it. The remainder were receptive to tutoring assistance, but it was found that very few of them actually took advantage of tutoring. This tends to illustrate the attitudinal or motivational differences of these students as referred to on the previous page.

3. There appears to be still another type of student noted in the study and this refers to those students who made a poor start in the fall semester, but who suddenly braced up and salvaged themselves in the spring semester without the benefit of tutoring services for the most part. These students are referred to in Chapter 2 (Table 5) of this study.

A major conclusion reached here is that academic probation, and the ultimate threat of academic suspension, is effective for some students who have the basic potential to succeed in college. In other words, low motivational levels and negative or neutral academic attitudes can be changed for some students by means of stringently enforced probation and suspension regulations.

The converse of this conclusion is also true, for those students who are most probation-prone, as noted previously. Either feelings of false hope, or feelings of hopelessness, appears to immobilize some freshmen who are placed on probation and who ultimately earn academic suspension.

4. It was noted in the basic data that those freshmen who were predicted below average in three or four of the required academic areas were most likely to be the freshmen who were placed on probation and ultimately suspended.

The major conclusion reached here is that this type of student would probably be best advised to seek admission in a junior college or seek vocational-technical education in approved institutions. The probability of their success in a four-year institution is too low to risk their admission to this college. Should they demonstrate greater potential than was predicted, by attendance at a junior college or other institution, then their admission status at this college could be reconsidered.

It is unfortunate that some data collected for this study could not be utilized because time did not permit. Additional analysis will be made during 1971-72, and possibly published later.

Supplementary and Appendix Materials

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Appendix

TUTOR'S MONTHLY RECORD OF SERVICES FOR INDIVIDUAL STUDENTS IN PROGRAM

This sheet should be turned in at the end of each month (along with your "Reimbursement sheet") to the Head of the Instructional Division for whom you are tutoring. These individual student report sheets should substantiate your "Reimbursement" sheet.

REPORT ON A SURVEY OF NON-TUTORED STUDENTS
Spring Semester 1971

Early in the spring semester of 1971 (March) a survey was conducted involving those students who had been predicted to have academic difficulty. The conference was more or less structured and strictly adhered to by each interviewer. A total of fifty-one (51) students were contacted and their responses were evaluated into one or more of the following categories:

- A. Receptive (would seek assistance)
- B. Rejected (idea of assistance-felt it was not needed)
- C. Neutral (to idea of this type of assistance)
- D. Unaware (that assistance was available)

Of the number contacted (51), 74% were "Receptive" (A), while 17% "Rejected" (B), the idea of academic assistance. We found 9% "Neutral" (C), while 39% were "Unaware" (D), that help was available.

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Addendum to the Study

Raw Data Storage:

All raw data collected and used as a basis for the findings for this study are on file in the Counseling and Testing Office at the Northeast Missouri State College, Kirksville, Missouri 63501.

The tabular data appearing in this study represents the summarization of certain aspects of the collected raw data. Certain delays in the collection and analysis of raw data, plus the deadline for submission of the final form of this report, did not permit the conversion of rough raw data tables into printed smooth copies of this data for the most part.

Final reproductions of the tabulation of most raw data will be available to interested parties at a later time upon request.

Certain conclusions concerning the effectiveness of tutoring services are drawn from the rough raw data tables as well as from the summarized tabular data appearing in this study. This in particular was true for conclusions about the effectiveness of tutoring in Mathematics. On the next page the reader will note the smooth copy of the final tabulation of total data on students who were tutored in Mathematics. This will illustrate the data available on the other academic areas, but not reproduced at this time.

In addition, much raw data is available that has not been analyzed as yet, due to the pressure of time and the heavy work schedules of the investigating team members while performing their regular duties at the college.

Additional analysis of data available will be continued during the fall semester of 1971 and a report will be made for local consumption. Once again, interested parties may request copies of this report.

A concluding statement is probably in order with regard to the suspected difference in operational definitions of the term "unsuccessful students," as used by the investigation team, and as interpreted "personally" by the tutored students. The investigators considered students unsuccessful when they earned below a C grade in a course or courses. However, essentially A and B level students might consider themselves unsuccessful if a C grade was in prospect for a particular course. This inference will be investigated.

TOTAL TUTORED STUDENTS IN MATHEMATICS DURING 1970-71. THEIR PREDICTED GRADE LEVEL (PGL) IS BASED UPON BOTH PREDICTION EQUATIONS AND CUMULATIVE SEMESTER GPA. THEIR EARNED GRADE LEVEL (EGL) IS BASED UPON SEMESTER GRADES IN MATH.

(PGL) Below 2.0		(PGL) From 2.0-2.99		(PGL) From 3.0-4.0		GRAND TOTAL (PGL) & (EGL)	
EGL	Total Students (%)	EGL	Total Students (%)	EGL	Total Students (%)	EGL	Total Students (%)
4.0	1 1%	4.0	28 14%	4.0	27 41%	4.0	56 16%
3.0	10 13%	3.0	47 23%	3.0	21 32%	3.0	78 22%
2.0	32 40%	2.0	94 46%	2.0	15 23%	2.0	141 40%
1.0	28 35%	1.0	29 14%	1.0	2 3%	1.0	59 17%
0.0	9 11%	0.0	6 3%	0.0	1 2%	0.0	16 5%
N =	80(23%)	N =	204(58%)	N =	66(19%)	N =	350 (100%)

Please note above that 80 out of 350 tutored students in Math were predicted to make below a 2.0 in Math (23% of the total are predicted below 2.0). However, 54 per cent of those students predicted below a 2.0 in Math actually earned a 2.0 or better. Also note, that 204 tutored students in Math are predicted to make grades in the C range. Only 17 per cent of these "average" students failed to do so. Sixty-six (66) students were predicted to make grades in the A and B range in Math and 73 per cent of them did so. Another 23 per cent made a 2.0 in Math and only 5 per cent made below a 2.0 in Math from this group.